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EXAMINER	
TIMORY, KABIR A	
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2611	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/525,451	LEI ET AL.	
	Examiner	Art Unit	
	Kabir A. Timory	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 February 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 February 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 7-14 are objected to because of the following informalities:

(1) In claims 7, line 3: Insert a **--period--** at the end of the line.

(2) In claims 12, line 3: Insert a **--period--** at the end of the line.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-4, 7-9, 12-19, 22-25, 28-31, and 34-36 are rejected under 35 U.S.C. 102(b) as being anticipated by Huang et al. (US 6,067,292).

Regarding claim 1:

As shown in figures 1-23, Huang et al. discloses in a receiver of a communication system, a method for reducing noise in a transformed signal (col 1, lines 35-37), said

transformed signal having a plurality of signal components, said method comprising the steps of:

- receiving a transformed signal by a detector of said communication system (603 and 604 in figure 6);
- processing said transformed signal (605 in figure 6, 2203, in figure 22); and
- reconstructing (606 and 607 in figure 6, 607, 606 in figure 22) a predetermined number of times, by a reconstructing module (606 and 607 in figure 6, 607, 606 in figure 22), one or more signal components of said plurality of signal components (see figure 22 and 23), said reconstructing being based upon said processing step (2203, 603, 604, 606, and 607 in figure 22) to thereby reduce noise (cancelling interference is interpreted to be reducing noise) in said transformed signal (col 8, lines 31-36).

Regarding claim 2:

Huang et al. further discloses wherein said processing step comprises the step of identifying said one or more signal components based upon a charnel estimate of said plurality of signal components (figures 7, 8, 9, col 2, lines 64-67,).

Regarding claim 3:

Huang et al. further discloses wherein said processing step comprises the step of providing an estimated signal from said transformed signal at output of said detector and based upon said channel estimate (700 and 700' in figure 7, col 8, lines 43-46).

Regarding claim 4:

Huang et al. further discloses wherein said processing step further comprises the step of decision processing said estimated signal using a plurality of decision modules (2301, 2302, 2303, and 2304 in figure 23).

Regarding claim 7:

Huang et al. further discloses wherein said reconstructing step comprises the step of providing a reconstructed transformed signal of said transformed signal (figures 8 and 9, col 9, lines 40-43).

Regarding claim 8:

Huang et al. further discloses wherein said reconstructing step further comprises the step of providing another estimated signal from said reconstructed transformed signal at said output of said detector and based upon said channel estimate (figures 7, 8, and 9).

Regarding claim 9:

Huang et al. further discloses wherein said processing step further comprises the step of decision processing said another estimated signal using said plurality of decision modules (2301, 2302, 2303, and 2304 in figure 23).

Regarding claim 12:

Huang et al. further discloses wherein said reconstructing step further comprises the step of determining whether said one or more signal components has been reconstructed said predetermined number of times (606 and 607 in figure 6, col 8, lines 31-36).

Regarding claim 13:

Huang et al. further discloses wherein said reconstructing step further comprises the step of determining whether to process another one or more signal components of said plurality of signal components (606 and 607 in figure 6, col 8, lines 31-36).

Regarding claim 14:

Huang et al. further discloses and further comprising the step of providing current estimated signal for subsequent processing when determined that iteration of said another signal component is not required (this limitation is interpreted to be part of decision making) (2203 in figure 22).

Regarding claim 15:

Huang et al. further discloses wherein said reconstructing step further comprises the step of simultaneously reconstructing two or more of said another one or more signal components (606 and 607 in figure 6, 1710, 1710', 1710" in figure 23).

Regarding claim 16:

The method as claimed in Claim 13, wherein said reconstructing step further comprises the step of reconstructing, one at a time, each of said another one or more signal components (606 and 607 in figure 6, 1710, 1710', 1710" in figure 23).

Regarding claim 17:

Huang et al. further discloses wherein said reconstructing step further comprises the step of simultaneously reconstructing two or more of said one or more signal components (606 and 607 in figure 6).

Regarding claim 18:

Huang et al. further discloses wherein said reconstructing step further comprises the step of reconstructing, one at a time, each of said one or more signal components (606 and 607 in figure 6).

Regarding claim 19:

As shown in figures 1-23, Huang et al. discloses a receiver for reducing noise in a transformed signal, said transformed signal having a plurality of signal components, said receiver comprising:

- a signal reconstructing section (606 and 607 in figure 6) having:
- a detector for detecting said transformed signal (603 and 604 in figure 6);
- one or more decision modules (2301, 2302, 2303, and 2304 in figure 23), each of said one or more decision modules having an input coupled to output of said detector (see figure 23); and
- a reconstructing module (606 and 607 in figure 6, 1710, 1710', 1710" in figure 23) having one or more inputs (1710, 1710', 1710" in figure 23), said one or more inputs being respectively coupled to output of said one or more decision modules (see figure 23),
- wherein said reconstructing module (1710, 1710', 1710" in figure 23) is adapted to reconstruct one or more signal components of said plurality of signal components a predetermined number of times to thereby form a noise-reduced transformed signal (cancelling interference is interpreted to be reducing noise) in said transformed signal (col 8, lines 31-36).

Regarding claim 22:

Huang et al. further discloses wherein said reconstructing module (606, 607 in figure 22) is adapted to perform reconstruction based on a relationship between a received signal component and a transmitted signal (figures 1, 2, and 6 col 17, lines 30-33).

Regarding claim 23:

Huang et al. further discloses wherein said reconstructing module is adapted to perform simultaneous reconstruction of two or more of said one or more signal components (606 and 607 in figure 6, 1710, 1710', 1710" in figure 23).

Regarding claim 24:

Huang et al. further discloses wherein said reconstructing module is adapted to perform reconstruction of said one or more signal components signal components one at a time (606 and 607 in figure 6, 1710, 1710', 1710" in figure 23).

Regarding claim 25:

As shown in figures 1-23, Huang et al. discloses a communication system comprising:

- a signal reconstructing section (606, 607 in figure 22) for reducing noise in a transformed signal, said transformed signal having a plurality of signal components (cancelling interference is interpreted to be reducing noise) in said transformed signal (col 8, lines 31-36), said signal reconstructing section having:
- a detector (603, 604 in figure 22) for detecting said transformed signal;
- one or more decision modules (2203 in figure 22), each of said one or more decision modules having an input coupled to output of said detector (see figure 22) ; and

- a reconstructing module (606 and 607 in figure 6, 1710, 1710', 1710" in figure 23) having one or more inputs, said one or more inputs being respectively coupled to output of said one or more decision modules (2301 in figure 23),
- wherein said reconstructing module (606, 607 in figure 22) is adapted to reconstruct one or more signal components of said plurality of signal components by a predetermined number of times to thereby form a noise-reduced transformed signal (cancelling interference is interpreted to be reducing noise) (col 8, lines 31-36).

Regarding claim 28:

Huang et al. further discloses wherein said reconstructing module (606, 607 in figure 22) is adapted to perform reconstruction based on a relationship between a received signal component and a transmitted signal (figures 1, 2, and 6 col 17, lines 30-33).

Regarding claim 29:

Huang et al. further discloses wherein said reconstructing module is adapted to perform simultaneous reconstruction of two or more of said one or more signal components (Pilot 0 and Pilot 1 in figure 22).

Regarding claim 30:

Huang et al. further discloses wherein said reconstructing module is adapted to perform reconstruction of said one or more signal components signal components one at a time (Pilot 0 and Pilot 1, 606, 604 in figure 22).

Regarding claim 31:

As shown in figures 1-23, Huang et al. discloses a signal reconstructing section for a receiver to reduce noise in a transformed signal, said transformed signal having a plurality of signal components, said signal reconstructing section comprising:

- a detector (603, 604 in figure 22) for detecting said transformed signal;
- one or more decision modules (2203 in figure 22), each of said one or more decision modules having an input coupled to output of said detector (see figure 22) ; and
- a reconstructing module(606, 607 in figure 22) having one or more inputs, said one or more inputs being respectively coupled to output of said one or more decision modules (see figure 22),
- wherein said reconstructing module (606 and 607 in figure 6, 1710, 1710', 1710" in figure 23) is adapted to reconstruct one or more signal components of said plurality of signal components by a predetermined number of times to thereby form a noise-reduced transformed signal (cancelling interference is interpreted to be reducing noise) (col 8, lines 31-36).

Regarding claim 34:

Huang et al. further discloses wherein said reconstructing module is adapted to perform reconstruction based on a relationship between a received signal component and a transmitted signal (figures 1, 2, and 6 col 17, lines 30-33).

Regarding claim 35:

Huang et al. further discloses wherein said reconstructing module is adapted to perform simultaneous reconstruction of two or more of said one or more signal components (Pilot 0 and Pilot 1 in figure 22).

Regarding claim 36:

Huang et al. further discloses wherein said reconstructing module is adapted to perform reconstruction of said one or more signal components signal components one at a time (Pilot 0 and Pilot 1 in figure 22).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 5, 6, 10, 11, 20, 21, 26, 27, 32, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. in view of Dabak et al. (US 2003/0002568).

Regarding claims 5, 10, 21, 27, and 33:

Huang et al. discloses all of the subject matter as described above except for specifically teaching wherein said decision processing step comprises the step of soft decision processing.

However, Dabak et al. in the same field of endeavor, teaches wherein said decision processing step comprises the step of soft decision processing (23 in figure 2, par 0041, lines 1-22).

One of ordinary skill in the art would have clearly recognized that there are algorithms to perform soft/hard decision in the system such as Viterbi decoding methodology. The soft decision algorithm makes a soft decision on the bits and the hard decision algorithm makes a hard decision on the received bits. These two methodologies are used for channel estimation and maximum likelihood decoding and to reduce noise and interference in the system.

In order to minimize the noise and interference in the system, it would have been obvious to one ordinary skill in the art at the time the invention was made to use the soft/hard decision decoding and decision making methodologies as taught by Dabak et al. in multi-path interference cancellation for transmit diversity. By doing so, we can reduce noise and intra symbol interference (ISI) in the system.

Regarding claim 6, 11, 20, 26, and 32:

Huang et al. discloses all of the subject matter as described above except for specifically teaching wherein said decision processing step comprises the step of hard decision processing.

However, Dabak et al. in the same field of endeavor, teaches wherein said decision processing step comprises the step of hard decision processing (23 in figure 2, par 0041, lines 1-22).

One of ordinary skill in the art would have clearly recognized that there are algorithms to perform soft/hard decision in the system such as Viterbi decoding methodology. The soft decision algorithm makes a soft decision on the bits and the hard decision algorithm makes a hard decision on the received bits. These two methodologies are used for channel estimation and maximum likelihood decoding and to reduce noise and interference in the system.

In order to minimize the noise and interference in the system, it would have been obvious to one ordinary skill in the art at the time the invention was made to use the soft/hard decision decoding and decision making methodologies as taught by Dabak et al. in multi-path interference cancellation for transmit diversity. By doing so, we can reduce noise and intra symbol interference (ISI) in the system.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kabir A. Timory whose telephone number is 571-270-1674. The examiner can normally be reached on 6:30 AM - 3:00 PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kabir A. Timory
January 15, 2008

SHUWANG LIU
SUPERVISORY PATENT EXAMINER